

HIGH - TTC

NUMBER OF LANES

Evaluation Criteria – Number of I-15 lane and shoulder miles added or improved, by type and level of improvement.

Edit	Facts	Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses
	<p>Lanes and Shoulders:</p> <ul style="list-style-type: none"><li>4 foot shoulder: 4.03 miles</li><li>6 foot shoulder: 2.37 miles</li><li>8 foot shoulder: 4.82 miles</li><li>10 foot shoulder: 0.00 miles</li><li>12 foot shoulder: 79.37 miles</li><li>Auxiliary Lane: 22.58 miles</li><li>11 foot GP Lane: 45.41 miles</li><li>12 foot GP Lane: 136.8 miles</li><li>HOV Lane: 42.25 miles</li><li>4 foot buffer: 36.37 miles</li><li>&lt;4 foot buffer: 5.88 miles</li></ul> <p>Lane Miles:</p> <ul style="list-style-type: none"><li>Shoulder: 85.11 lane miles (12 feet by 1 mile)</li><li>Travel Lanes: 239.74 lane miles (12 feet by 1 mile)</li></ul> <p>Additional Information:</p> <ul style="list-style-type: none"><li>None</li></ul>		<ul style="list-style-type: none"><li>The Proposal provides 247 miles of new or improved mainline lanes (Total of Auxiliary, HOV and GP lanes)</li><li>The Proposal provides the full build-out of the Ultimate Infrastructure Configuration width</li><li>The Proposal provides full build-out of the mainline to meet 2030 traffic demand between University Avenue and US6 including:<ul style="list-style-type: none"><li>Full shoulder widths provided through replacement or widening of mainline and overcrossing bridges</li><li>Replaces bridges at Provo Spanish Fork 2700N (over I-15); UPRR; Spanish Fork Main Street</li></ul></li><li>The proposal Completes the full extent of the currently planned Express Lane system between Provo Center Street adn US6.</li></ul>	<ul style="list-style-type: none"><li>The proposal provides an I-15 SB auxilary lane from SR-77 to US 6. The addition of this auxiliary lane will improve the 2030 peak hour level of service from D to C for 4 mainline GP lanes.</li></ul>	<ul style="list-style-type: none"><li>Mainline shoulder width deviations required in US6 area from just north of UTA crossing to US6. (These deviations were not included in the submitted Form D or Form U)</li><li>The shoulder width does not provide stoping sight distance on the mainline at the US6 bridge crossing over I-15 due to the existing median pier</li><li>The proposal provides one less NB lane than is provided in the FEIS footprint between SR75 and University Avenue. Future work will be required to complete I-15 as defined by the FEIS.</li></ul>	<ul style="list-style-type: none"><li>The Proposal implements GP lane, Buffer, and shoulder width reductions between Provo Center Street and University Avenue.</li></ul>

NUMBER OF INTERCHANGES

Evaluation Criteria – Number of interchanges reconstructed or improved and level of improvement.

Edit	Facts	Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses
	<p>Number of Interchanges Reconstructed or Improved:</p> <ul style="list-style-type: none"><li>Reconstructed: 7</li><li>Improved: 7</li></ul> <p>Reconstructed: (7)</p> <ol style="list-style-type: none"><li>AF 500 E</li><li>1600 North</li><li>800 North</li><li>Orem Center</li><li>Provo Center</li><li>US-6</li><li>SF Main</li></ol>		<ul style="list-style-type: none"><li>US6 I/C:<ul style="list-style-type: none"><li>Reconstructed to 2030 traffic demand</li><li>Direct ramp movement from I-15 NB to US6 EB (braided ramp with Spanish Fork Main Street on-ramp to I-15 NB)</li></ul></li><li>Spanish Fork Main Street I/C: Reconstructed to provide for 2030 traffic demands</li></ul>	<ul style="list-style-type: none"><li>Tight diamonds I/C's at Orem Center street maximize the distance between ramp terminals and adjacent I/S's</li><li>US6 I/C: Free flow movement from SB I-15 to EB US6</li></ul>	<ul style="list-style-type: none"><li>University Parkway I/C and Sandhill Road I/S complex:<ul style="list-style-type: none"><li>Counter Flow I/S is not consistent with driver expectancy; high number of relatively inexperienced or in frequent users due to proximity to UVU and BYU</li><li>Non signalized NB I-15 to College Drive traffic must move across University Parkway in a marginal distance.</li><li>Provo Center Street I/C:<ul style="list-style-type: none"><li>Access to Draper Lane is circuitous (requires trips around the block) and is at or beyond RFP maximum (depending on how measured)</li><li>Access from Independence and</li></ul></li></ul></li></ul>	

Improved: (7)

- 1. Lehi Main
- 2. AF Main
- 3. PG Blvd
- 4. University Parkway
- 5. University Ave
- 6. North Springville
- 7. South Springville

- Draper Lane merge at essentially the same location (sight distance and operational concerns)
- Spanish Fork Main Street I/C: The sight distance at the I-15 Northbound off ramp terminal is compromised due to bridge pier (@Spanish Fork Main Street)

Additional Information:

OPERATIONAL METRICS OF MAINLINE  
Evaluation Criteria – Operational metrics of mainline, at and between interchanges.

Edit	Facts	Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses
	<p><b><u>For all 50 segments:</u></b></p> <p><b><u>AM Peak</u></b> LOS C or better: 40 segments LOS D: 8 segments LOS E/F: 2 segments</p> <p><b><u>PM Peak</u></b> LOS C or better: 27 segments LOS D: 20 segments LOS E/F: 3 segments</p> <p><b><u>For the 18 segments on which differences exist in number of lanes among the three proposals:</u></b></p> <p><b><u>AM Peak</u></b> LOS C or better, 11 segments LOS D, 5 segments LOS E/F, 2 segments</p> <p><b><u>PM Peak</u></b> LOS C or better, 7 segments LOS D, 8 segments LOS E/F, 3 segments</p> <p><b>Within UIC</b></p> <p>Northbound</p> <p>Auxiliary Lane between 1600N and PG Blvd LOS D</p> <p>Southbound</p> <p>Transition at the northern terminus LOS D</p> <p>Aux lane between Orem Center and University Parkway LOS C</p> <p><b>South of UIC</b></p> <p>Northbound</p> <p>Between US6 Ramps LOS B</p> <p>Between ramps at SR-77 LOS C</p> <p>Between ramps at University Avenue LOS D</p> <p>Southbound</p>		<ol style="list-style-type: none"><li>1. Proposer provided LOS D or better for full build out of UIC.</li></ol>	<ol style="list-style-type: none"><li>1. Proposer provided LOS D or better for portions of mainline south of the UIC.</li><li>2. 40 out of 50 segments LOS C in AM.</li><li>3. 27/50 segments LOS C in PM.</li></ol>	<ol style="list-style-type: none"><li>1. The lack of additional GP lanes through Provo from University Avenue to Provo Center Street has an impact on the peak hour operations for each direction of travel. Southbound 2030 peak hour I-15 mainline congestion will be pushed back into the University Parkway I/c Area</li></ol>	<ul style="list-style-type: none"><li>2 AM and 3 PM mainline segments perform at LOS E or worse<ul style="list-style-type: none"><li>AM: NB SR 75 @ structure, NB University Avenue to Provo Center Street</li><li>PM: NB University Avenue to Provo Center, SB Provo Center to University Avenue, Under structure @ Univ. Avenue</li></ul></li></ul>

Between ramps at SR-75  
LOS D

South of the US6 exit  
LOS D

OPERATIONAL METRICS OF TRANSITIONS  
Evaluation Criteria –

Operational metrics of mainline transitions to existing facilities.

Edit Facts



Edit

Significant Strengths

Minor Strengths

Minor Weaknesses

Significant Weaknesses



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Traffic Group Input:

- 1. Lehi Main - existing diamond - VISSIM output
  - 1. 2020 AM LOS
    - 1. Intersection
      - 1. SB ramp = C
      - 2. NB ramp = C
    - 2. Freeway
      - 1. Transition from south of AF Main to the center of the Lehi operates within B and C
      - 2. North of Lehi Main where the facility ties back into existing LOS = D
  - 2. 2020 PM LOS
    - 1. Intersection
      - 1. SB ramp = B
      - 2. NB ramp = C
    - 2. Freeway
      - 1. Southbound
        - 1. LOS = D
      - 2. Northbound
        - 1. LOS = D
- 2. Southern Terminus - Spanish Fork VISSIM output
  - 1. 2020 AM LOS
    - 1. Intersection
      - 1. US-6/Chappel = C
      - 2. SB Ramps/Main St = B
      - 3. NB Ramps/Main St = A
    - 2. Mainline
      - 1. SB = A
      - 2. NB = C
  - 2. 2020 PM LOS
    - 1. Intersection
      - 1. US-6/Chappel = C
      - 2. SB Ramps/Main St = B
      - 3. NB Ramps/Main St = A
    - 2. Mainline
      - 1. SB = C
      - 2. NB = B

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Northern terminus TTC Facts

NB Drop the 5th lane at the Lehi Mains Street off ramp  
NB The 4th lane is an option off at Lehi Main Street with the lane merging into the 3rd lane within the interchange  
at Lehi Main street  
SB Add the 4th and 5th lane are added within the interchange

Southern Terminus TTC Facts

- Northern Terminus-contains logical and smooth lane transitions
  - Lanes end at ramps
  - Transition from south of AF Main to the center of the Lehi interchange operates within B and C.
- Southern Terminus-contains logical and smooth lane transitions
  - Lanes end at ramps
  - Because this Proposer terminates the project at the US6 interchange, their southern terminus performs at a higher level of service than the requirements, due to the absence of a merge area.
  - Southern terminus: Mainline southbound 2020 AM - LOS A.
  - Southern terminus: Mainline northbound 2020 PM - LOS B.

NB The NB express lane is added to the median as an express lane south of SF Main  
NB two additional lanes are added at the US 6 on ramp  
SB At the US 6 off ramp, two lanes are dropped at the US 6 off ramp.  
The SB espress lane is merged in to the inside lane north of US6  
The NB express lane is develope from the inside lane under US 6

REGIONAL MOBILITY - TDM

Evaluation Criteria Level of improvement to regional mobility associated with mainline improvements using the results from the TDM, as listed below:

- o VMT
- o VHT
- o Average speed
- o Total delay
- o User costs
- o Percent VMT with V/C greater than or equal to 1 (for all links excluding centroid connectors)

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Note: These MOE's were able to be re-created by the evaluation team. Therefore, no modifications were made to the base WFRC/MAG model. Only changes to the master network file needed to be verified.

Discrepancies Between Master Network and Instructions

1. The functional type of I-15 was only allowed to be changed if a lane was added. Under the No Build conditions, the functional type of I-15 was FT31 which is a lower capacity freeway. If a lane was added, the functional type was allowed to be changed to FT32 which is a higher capacity freeway. TTC changed all of I-15 in the study area to FT32 even where no additional lanes were proposed. This impacted a total of 8.5 miles (NB and SB counted separately) of the freeway that were assigned FT32 by TTC and should have remained FT31.

Discrepancies Between Master Network and Design Files

1. The SF Main SB On-Ramp acceleration lane is 850 ft in the model, but the design shows about 200 ft. SF Main Street shows 3 lanes each direction north of 1000 North in the design, the model only shows 2 lanes up to the ramp intersection (high volume area).
2. The Springville 400 South NB Off-Ramp deceleration lane is not included in the model.
3. North Springville (SR-75) NB On-Ramp acceleration lane is not included in the model.
4. University Avenue just north of NB on-ramp – the mainline is coded as 5 lanes for 1887 feet while the design shows its length at 700 feet. Then north of that mainline is coded as 4 lanes for 1400 feet while the design shows it at 1600 feet.
5. The SB I-15 transition at Provo Center Street from 4 to 3 lanes occurs about 600 ft too far south in the model compared with the design.
6. The Provo Center SB Off-Ramp is 3150 ft in the model and 1100 ft in the design (med-low volume ramp). The NB On-Ramp is 2500 ft in the model and 1800 ft in the design (med volume ramp). The NB On-Ramp acceleration lane is not included in the model. Provo Center Street EB drops to 2

1. The ultimate 2030 facility significantly improves regional traffic condition variables over the No Build condition, particularly in the PM peak period, the heaviest of the two peak periods.

Provision of HOV lane, four GP lanes, and auxiliary lane southbound from University Avenue to Spanish Fork. Provision of HOV lane, three GP lanes, and auxiliary lane northbound from Spanish Fork to University Avenue.

1. This AM peak operations in the Provo Area are limited by the lack of an additional GP lane in the northbound direction over the No Build conditions.
2. NB and SB between PG and 1600 North Orem - exception to LOS D in UIC.
3. NB merge between American Fork 500 East and American Fork Main - exception to LOS D in UIC.
4. 500 East area: NB direction between 500 East and American Fork Main is borderline LOS D/E.
5. Provo Center Street area: LOS E merge area South of Provo Center.



- lanes prior to 900 West, but the design shows it should remain 3 lanes.
- University Parkway NB just south of NB Off-Ramp there is a 5 GP lane section that is 706 ft in the model but is 1300 ft in the design.
  - A small segment in the University Parkway SPUI is coded 3 lanes in the model and it should be 2 lanes (medium volume area)
  - University Parkway NB On-Ramp has a 4 lane segment that is 790 ft while in the design it is much less in the design (100 ft or 200 ft) (high volume ramp).
  - Orem Center Street NB On-Ramp is coded 3 Lanes in the model, but the design shows transition to 2 lanes before the I-15 merge (medium volume ramp). The acceleration lane is 770 ft in the model, but the design shows a lane drop right at the gore. The SB On-Ramp is coded 2 Lanes in the model, but the design shows transition to 1 lane before the I-15 merge (low volume ramp).
  - The 800 North NB On-Ramp is coded as 3 lanes in the model and the design shows a transition to 2 lanes before merging with I-15 (high volume ramp). The SB On-Ramp acceleration lane is not coded in the model.
  - 1600 North SB On-Ramp acceleration lane is not included in the model. 1600 North under the I-15 structure is coded as 3 lanes each direction and the design shows only 2 thru lanes (medium volume area). The NB On-Ramp acceleration lane is not included in the model.
  - Pleasant Grove Blvd NB Off-Ramp coded at 2 lanes in the model but is only one lane in the design (med volume ramp). The SB On-Ramp acceleration lane is not included in the model. The NB On-Ramp is coded 2100 ft but the design is only 1300 ft. The acceleration lane is not included in the model.
  - 500 East DDI is coded in the model as 3 lanes in each direction on the arterial street while the DDI design has 2 lanes in each direction across the bridge (medium volume area).
  - Lehi Main SB On-Ramp is coded 2 Lanes in the model, but the design shows transition to 1 lane before the I-15 merge (medium volume ramp).

**Impact of Discrepancies**

The net impact of discrepancies from the Instructions and the Design Files is **slightly negative to the MOE's** reported (i.e. the reported values are better than they would be if the discrepancies were correctd). However, with the exception of the Percent VMT with V/C >=1, **all MOE's are within 1% of the reported value**. The attached spreadsheet provides details.

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**LAP**

**[From required regional mobility narrative, general]:**

- Acknowledged the importance of reducing the reliance on parallel areterial/local street networks, reconfiguring and/or improving interchange operations, and enhancing adjacent intersections to allow more efficient traffic flow to and from I-15.

**[From required regional mobility narrative, mainline]:**

- Within the UIC provide LOS D in 2030 with a **few exceptions**: NB and SB between Pleasant Grove and 1600 North Orem [**do not consider aux lane feasible**]; and NB merge between American Fork 500 East and American Fork Main [**do not consider aux lane feasible**]. **Consider a sixth general purpose lane would exceed the defined width of the UIC**.
- Consider a major improvement to regional mobility is associated with the provision of an HOV lane, four or five GP lanes, and aux lanes to match initial UDOT contract from American Fork Main to Provo Center Street.
- Consider a major improvement to regional mobility is associated with the provision of an HOV lane, four GP lanes, and aux lanes Southbound from University Avenue to Spanish Fork Main.
- Consider a major improvement to regional mobility is associated with the provision of an HOV lane, three GP, and aux lanes Northbound from Spanish Fork Main to University Avenue.
- The addition of auxiliary lanes in the Northbound direction from Spanish Fork Main to University Avenue provides LOS D through 2030.
- Even though the parallel corridors show slightly less volume, the connecting routes to the I-15 corridor contain slightly more volume.
- Improvements reduce regional delay on parallel routes by 52% and reduce VHT and VMT 24% and 19%, respectively.
- North Termini: 5-4-3 lane drop sequence operates at LOS D for 2020.
- 500 East area: NB direction between 500 East and American Fork Main is **borderline LOS D/E** [consider aux lane not feasible].
- Orem Center Street area: Auxiliary lane contributes to LOS C/D operations.
- University Parkway area: Mainline operates at LOS D; SPUI and CFI at Sandhill due not adversely affect I-15 operations.
- Provo Center Street area: LOS D for AM and PM peak periods on mainline except for **LOE E** for

- merge area South of Provo Center.
13. South Termini: Tested the South transition improvements for 2020 and 2030 and determined that in both cases LOS D or better is provided.

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REGIONAL MOBILITY - VISSM

Evaluation Criteria Level of improvement of the interchange operations using the results from the VISSIM models as listed below:

- o Delay
- o Speed
- o Density
- o Travel time index
- o Queuing

Edit Facts



Edit

Significant Strengths

Minor Strengths

Minor Weaknesses

Significant Weaknesses



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[From required regional mobility narrative, interchanges]:

1. I-15, US6, Spanish Fork Main system interchange improvements in NB and SB, including flyover ramps to and from I-15 to US6 that bypass the Spanish Form Main ramp intersetions.
2. Diamond interchange operations at Lehi Main meet criteria of LOS D. State that full interchange reconstruction is something that is beyond the scope of this project.
3. 500 East: DDI meets LOS criteria. Adjacent intersections meet LOS criteria.
4. Center Street Orem: Tight diamond meets LOS criteria. State that a signalized intersection would not function at an overall LOS D.
5. University Parkway: SPUI at University Parkway meets criteria once adjustments are made to east-west stop bar locations to reduce the wide crossing dimension. State that the CFI at Sandhill allows more intuitive movements between SPUI and Sandhill". Pedestrian bridge provided for movements across University Parkway.
6. South Transition: Intersection node operations, individual movements at the Spanish Fork Main Ramp intersections meet LOS D criteria.

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All VISSIM file observations

1. Ramp meter detection doesn't match UDOT standard placement. Meters turn green before the vehicles arrive at the stop bar.

Northern Terminus (Existing diamond - Lehi Main & Existing DDI - AF Main)

1. Design vs. model observations

1. AF Main SB off-ramp decel lane

1. Design = 1200 ft

2. Model = 1500 ft

2. HOV access points

1. Design = center under structures

2. Model = access allowed between the interchanges

3. AF Main NB off-ramp decel lane

1. Design = Approx. 2250 ft

2. Model = 1700 ft

4. Lehi Main EBR to SB I-15

1. Design = single lane

2. Model = 2 lanes – one of which is a shared through/right
2. AM peak hour MOEs (Year 2020)

1. Intersection LOS C or better

1. Ramp terminal movements: 9 of 12

2. Intersections: 4 of 4

2. Travel time index = 1.20
3. PM peak hour MOEs (Year 2020)

1. Intersection LOS C or better

Orem 800N

- Proposed SPUI reduces signalized intersection density along 800N which facilitates signal coordination and enhances queue storage in this primary route.

US6/Spanish Fork

- Accomodates 2030 traffic demand
- Freeflow movement from I-15 to US-6.
- Braided ramps from NB I-15 to US-6 and from NB Main Street to NB I-15.
- Closure of frontage road (Industrial Park Dr) at Spanish Fork Main improves access management.
- Loop ramp from US-6 to SB I-15 provides adequate acceleration lengths, eliminating a current weaving section with differential speed problems.
- NB Braided Ramps - Grade separation at Main for NB US-6 allows for free flow over SFMS

Orem Center Street

- The Southbound triple left from I-15 to Eastbound Center Street is received by two lanes east of 1200 W. Because of the close proximity of 1200W, this condition results in adverse level of service impacts.

Orem - University Parkway

- Queuing and storage conditions associated with the interaction of the SPUI and the CFI are, in a number of cases, borderline operations close to a LOS E/F condition.
- CFI operations immediately adjacent to a freeway interchange is an unconventional approach. It will therefore require close examination of signing and other driver expectancy items.

Provo Center Street

- Through movements between 1600W and I-15 Southbound ramps experience poor operational conditions. Therefore, this item would require mitigation.
- Introducing a signal with an offset intersection at the Draper intersection creates operational issues associated with signal operations and sight distance.

- 1. Ramp terminal movements: 11 of 12
  - 2. Intersections: 3 of 4
  - 3. Mainline: At structure over US-89 north of Lehi Main LOS = E in the PM peak hour.
- 2. Travel time
  - 1. NB-EB = 84 seconds
  - 2. NB-WB = 141 seconds
- 3. Travel time index = 1.32

American Fork 500 East (proposed – DDI)

- 1. Observations
  - 1. Vehicle type “bus” uses the weight and power functions of a passenger vehicle.
  - 2. PM - SB queue’s on 500 East extend beyond the network at signal with 620 South.
- 2. Design vs. model observations
  - 1. SB on-ramp
    - 1. Design = one lane
    - 2. Model = two lanes
  - 2. NB off-ramp
    - 1. Design = aux lane between PG and 500 E
    - 2. Model = develops decel lane 1200 ft south of gore point.
  - 3. PG Blvd
    - 1. Design = two lanes WB (existing)
    - 2. Model = three lanes WB feeding into one of the two left turn lanes for SB I-15.
- 3. AM peak hour MOE’s (Year 2030)
  - 1. Intersection LOS C or better
    - 1. Ramp terminal movements: 12 of 12
    - 2. Intersections: 3 of 3
  - 2. Travel time index = 1.11
- 4. PM peak hour MOE’s (year 2030)
  - 1. Intersection LOS C or better
    - 1. Ramp terminal movements: 12 of 12
    - 2. Intersections: 2 of 3
  - 2. Travel time index 1.19

Orem Center Street – Proposed tight diamond

- 1. Observations
  - 1. Heavy vehicle use the weight and power functions of a passenger vehicle.
  - 2. PM – congestion between NB ramp and 1200 West
- 2. Design vs. model observations
  - 1. VISSIM doesn’t show the Express Lane interaction north of 800 North.
- 3. AM peak hour MOE’s (Year 2030)
  - 1. Intersection LOS C or better
  - 2. Ramp terminal movements: 7 of 11
    - 1. Intersections: 4 of 4
  - 3. Travel time index = 1.24
- 1. PM peak hour MOE’s (Year 2030)
  - 1. Intersection LOS C or better
    - 1. Ramp terminal movements: 4 of 11
    - 2. Intersections: 1 of 4
  - 2. Travel time index = 1.41

Orem University Parkway – Proposed SPUI and CFI at Sandhill Rd

- 1. Observations
  - 1. Heavy vehicles use the weight and power functions of a passenger vehicle.
  - 2. Simulation highlights difficult weave from the NB ramp to the EB left turn at the CFI.
  - 3. SBL turning vehicles at the SPUI don’t yield to vehicles that are already on University Parkway due to congestion at Sandhill Road.
  - 4. Red clearance at the SPUI is 2 seconds. A requirement is 4 seconds. Fixed time signal control.
- 2. Design vs. model observations
  - 1. NB off-ramp decel lane

1. Design = 1500-1800 ft depending on measurement point
2. Model = 1400 ft
3. AM peak hour MOE's (year 2020)
  1. Intersection LOS C or better
    1. Ramp terminal movements: 6 of 10
    2. Intersections: 1 of 3
  2. Travel times
    1. SB-EB = 152 Seconds
    2. SB-WB = 93 Seconds
    3. NB-EB = 97 Seconds
    4. NB-WB = 125 Seconds
  3. Travel time index = 1.30
- 4.
5. PM peak hour MOE's (year 2020)
  1. Intersection LOS C or better
    1. Ramp terminal movements: 6 of 10
    2. Intersections: 1 of 3
  2. Travel times
    1. SB-EB = 147 seconds
    2. SB-WB = 83 seconds
    3. NB-EB = 93 seconds
    4. NB-WB = 90 seconds
  3. Travel time index = 1.30
- 6.

Provo Center Street – Proposed tight diamond

1. Observations
  1. Heavy vehicles use the weight and power functions of a passenger vehicle.
  2. Signal cycle lengths don't match along Center Street.
  3. Ramp meter storage is 140 in-ft short of contract requirements.
2. Design vs. model observations
  1. Draper lane
    1. Design = signalized intersection
    2. Model = no traffic control other than yield points.
  2. NB On-ramp
    1. Design = 1150 to 1350 ft depending on measurement point
    2. Model = 950 ft
  3. 900 West
    1. Design = 1 left, 2 through and right turn trap
    2. Model = 2 left, 3 through with shared right turn
3. AM peak hour MOE's (year 2030)
  1. Intersection LOS C or better
    1. Ramp terminal movements: 6 of 12
    2. Intersections: 4 of 4
  2. Travel times
    1. SB-EB = 132 seconds
    2. SB-WB = 50 seconds
    3. NB-EB = 100 seconds
    4. NB-WB = 100 seconds
  3. Travel time index = 1.20
4. PM peak hour MOE's (year 2030)
  1. Intersection LOS C or better
    1. Ramp terminal movements: 6 of 12
    2. Intersections: 3 of 4
  2. Travel time index = 1.24

US – 6 / Spanish Fork Main – Proposed reconfiguration: 3 SB lanes to US-6, improved ramp from US-6 to SB I-15 over SF Main St, Flyover NB Main St.

1. Design vs. model observations
  1. Express Lane NB
    1. Design begins at the US-6 on-ramp gore
    2. Model doesn't account for Express Lane
  2. Express Lane SB
    1. Design stops just before UP structure
    2. Model stops north of SR-77
  3. NB on-ramp from US-6 from 3 to 2 lanes is approximately 200 ft shorter in the model than



- the design.
- 4. Missing signal head for the southbound left turn at the NB ramp intersection with SF Main Street.
  - 5. US-6/Chappel Drive
    - 1. Design provides improvements to the north stop bar of the US-6 leg.
    - 2. Model includes lane improvements on Chappel Dr.
  - 2. AM peak hour MOE's (year 2020)
    - 1. Intersection LOS C or Better
      - 1. Ramp terminal movements: 11 of 11
      - 2. Intersections: 4 of 4
    - 2. Travel time index = 1.10
  - 3. PM peak hour MOE's (year 2020)
    - 1. Intersection LOS C or better
      - 1. Ramp terminal movements: 10 of 11
        - 1. Intersections: 4 of 4
        - 2. Travel time index = 1.12

MEDIUM - TTC  
OTHER OPERATIONAL IMPROVEMENTS  
Evaluation Criteria –

Other operational improvements including the following:

- o Number and nature of decision points
- o Length of weave areas
- o Width and location of shoulders and refuge areas
- o Number of bicycle/pedestrian conflicts with traffic
- o Provision of clear zones

Edit	Facts	Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses
Operation Characteristics Collected:				<ul style="list-style-type: none"><li>● Additional regional operational improvements are provided by the replacement of SF 2700N structure to the Spanish Fork Master Plan four lane typical section</li><li>● At Orem Center Street the tight diamond interchange increases pedestrian and bicycle safety by allowing for a bicycle/pedestrian phase in the signalizd ramp terminals, and by providing a continuous bike lane along the edge of the street. There are fewer pedestrian/traffic conflicts than would be present at a SPUI.</li></ul>	<ul style="list-style-type: none"><li>● Vehicle refuge area not provided between University Avenue and Provo Center Street. Shoulders are not wide enough for a vehicle to pull off of the mainline lanes for a length of 1 mile between interchanges.</li><li>● The sidewalk on the south side of Spanish Fork Main Street does not continue across the southbound on ramp. Pedestrians may be tempted to walk along the on ramp shoulder.</li></ul>	
PLEASE SEE ATTACHED FILE FOR THIS INFORMATION						
Additional Information:						
=====						
Traffic Group Input:						
<div>1. One mainline weaving area exists, Type B, on NB I-15 from Orem Center St to Orem 800 N. Based on HCS analysis, the weaving area length of 2500 ft provides 2030 LOS C in both the AM and PM peaks. AM peak density: 22.4 pc/mi/ln PM peak density: 27.6 pc/mi/ln.</div>						
=====						

NUMBER OF INTERSECTIONS  
Evaluation Criteria –

Number of intersections improved and level of improvement.

Edit	Facts	Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses
	<p>Improvements to Intersections:</p>		<ul style="list-style-type: none"><li>● Improved 23 additional intersections by adding additional permanent turn lanes, thru</li></ul>	<ul style="list-style-type: none"><li>● Orem Center Street-carried 3rd EB through</li></ul>	<ul style="list-style-type: none"><li>● The signalized intersection of Provo Center Street and Independence</li></ul>	

34 Intersections were improved:

- 28 thru lanes
- 10 left turn lanes
- 5 right turn lanes
- 18 acceleration lanes
- 11 medians
- 23 shoulders
- 29 sidewalks
- 29 improved pedestrian safety
- 29 improved ped access
- 28 improved bike safety

SEE ATTACHED MAPS FOR MORE SPECIFICS REGARDING EACH INTERSECTION

Additional Comments:  
None

lanes, acceleration lanes or shoulders, etc not required to meet LOS D with 2030 volumes:

- Lindon 400 North and Proctor Lane
- Orem 800 North and 1500 West
- Provo 500 West and Frontage Roads
- Provo Center Street and 1000 W
- Spanish Fork 2700 N & 200 E
- Spanish Fork 2700 N & 1950 W

lane through intersection with 1200 West

Avenue is within 400 feet of the intersection of Provo Center Street and 1000 West.

Structures

**Evaluation Criteria** – Extent of bridge improvements including:  
o Number of structurally deficient and/or functionally obsolete structures replaced  
o Number of structures rehabilitated and/or widened  
o Maintenance cost and ease of re-decking, inspection and maintenance for each structure type

Edit	Facts		Edit	Significant Strengths	Minor Strengths		Minor Weaknesses	Significant Weaknesses	
	From Data Miners:								
	<ul style="list-style-type: none"><li>• Replaced - 45</li><li>• Widened - 1 (US-6 Interchange - THIS BRIDGE IS STRUCTURALLY DEFICIENT)</li><li>• Rehabilitated - 1</li><li>• New Bridges - 5</li><li>• Drainage Structures - 1 major drainage crossing structure</li></ul>				<ul style="list-style-type: none"><li>• Rehabilitating and widening the US-6 flyover extends the life of the existing structure. However, it does not bring it up to current seismic standards.</li><li>• They have 45 existing bridges being replaced and 5 new bridges. Only 2 out of 50 bridges utilize steel girders. Therefore, 96% of the combined new and existing bridges are concrete superstructures which have the least long-term maintenance costs/requirements.</li><li>• Replacing 45 existing bridges.</li><li>• Utilizing silica fume in all concrete decks that will minimize corrosion and give a longer deck life.</li><li>• Providing 8.5" deck on all new and replaced bridges.</li></ul>				
	Out of the 45 replaced:								
	14 were Functionally Obsolete 4 were Structurally Deficient								
	SEE ATTACHED SPREADSHEET FOR MORE DETAILED INFORMATION								
	Additional Information:								
	(LRR) Rehabilitating US6 Interchange bridge. 35 yr service life exceeds ITP 20 yr, no seismic rehab mentioned (LRR) Use silica fume concrete in all 8.5 inch decks (LRR) Bridges standard beam and girder, redecking feasible (LRR) No mention of seismic (LRR) Did not replace 600 S, 920 S, bridges (MAD) Steel and PC/PS Girder Types								

Pavement

**Evaluation Criteria** – Anticipated pavement performance for each pavement type based on design output and evaluations of:  
o Location and extent of each type of pavement and pavement section, including surface treatments  
o Design Life o Life cycle costs

Edit	Facts		Edit	Significant Strengths	Minor Strengths		Minor Weaknesses	Significant Weaknesses	
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Pavement Quantities:

Mainline:

- 30 year Rigid: 216.11 lane miles
- 30 year Flexible: 10.27 lane miles
- 20 year Flexible: 112.08 lane miles

Ramps:

- 30 year Flexible: 36.26 lane miles
- 20 year Flexible: 3.60 lane miles

Cross Street Pavement:

- 30 year Flexible: 22.20 lane miles
- 20 year Flexible: 21.81 lane miles

SEE ATTACHED FILE FOR MORE DETAILED INFORMATION ON ABOVE ITEMS

Additional Information:

- Mainline PCCP section consists of:
  - 11 inches PCCP
  - 4 inches UTBC
  - 15 inches GB

Mainline HMA section varies

TTC indicates that a "Probabilistic Distress Model" shows that the pavements designed for 30 years will indeed perform for 35+ years. The distress modeling has no bearing on the analysis of their proposal. TTC has deisgned pavements using 30 year traffic ESAL's and is therefore, for all intents and purposes, a 30 year pavement.

- TTC is proposing PCCP for mainline paving (within the UIC area only)
- Laboratory testing indicates that the modulus values for the GB sources identified by the TTC for use on the project are more than 200% of the maximum value used by UDOT in design. This provides for conservatism in the pavement design which should result in superior performance.
  - It is noteworthy that TTC has not altered their design based on this information, but simply presented it as a "value added" comment.

- South of Provo Center Street TTC is proposing 20 year flexible paving. Plan sheets show the saw cut line of existing pavement where widening will begin. This saw cut line wanders/transitions into and accross travel lanes. This is a potential performance issue where the full depth widened section will adjoin the mill-and-fill overlay sections. The difference in the sections could be expected to cause reflective cracking to propagate up through the final overlay/wearing course.
- TTC has used a "Loss of Support" value of 0.0 for their rigid design. This value is contrary to the recommendations of the pavement design manual. It is a fact that the PCCP pavement will experience some loss of support from erosion or disturbance of an untreated base course during the life of the pavement. The main impact of disregarding "Loss of Support" values/input means that the mean-effective K-value is uncorrected, resulting in a thinner overall section.
- There are no provisions presented in the proposal addressing drainage of the pavement section.

LOW - TTC  
INTERIM FUNCTIONALITY  
Evaluation Criteria –

For areas between American Fork Main Street and Provo Center Street that will be constructed to less than full build out of the UIC:

- o Level of interim functionality
- o Amount of rework costs and traffic impacts required to complete full build-out,
- o 2020 and 2030 LOS
- o The associated year that the LOS crosses the D/E threshold

Edit	Facts		Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses	
				<ul style="list-style-type: none"><li>• The proposer provides the full UIC buildout.</li></ul>				

CROSS STREET OPERATIONAL METRICS  
Evaluation Criteria –

Operational metrics in cross street transitions to existing facilities

Edit	Facts		Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses	
	=====				<ul style="list-style-type: none"><li>• Orem Center Street, West Side: Carrying two lanes thru 1330 W provides more space for merging</li></ul>	<ul style="list-style-type: none"><li>• Lehi Main Street, West Side: The 400' Intersection spacing causes weaving and merging issues and may necessitate carrying a third lane thru the intersection</li></ul>		
	Traffic Group Input:							



- 1. See attached spreadsheet for detailed analysis of cross street transitions.

=====

- and weaving
- Orem 800N, East Side: Carrying 3 lanes thru the intersection provides additional capacity.
- Orem Center Street, East Side: Carrying only two lanes thru 1200 W does not provide enough space for merging and weaving, especially since the SB off ramp feeds three lanes of traffic into this intersection.
- Provo Center Street, West Side: Improvements not shown in proposal will be required west of Provo Center Street I/S with 1600W in order to implement proposed improvements on the east leg of that I/S.
- Spanish Fork 2700N transitions are abrupt

NON-MOTORIZED IMPROVEMENTS

Evaluation Criteria – Extent and functionality of non-motorized improvements.

Edit	Facts		Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses	
	<ul style="list-style-type: none"><li>● Non Motorized Improvements:<ul style="list-style-type: none"><li>○ 29.2 miles Fiber Backbone</li><li>○ 11 signalized intersections</li><li>○ 1 pedestrian separated crossing</li><li>○ 58,178 feet bike lane (could be striped or not striped)</li><li>○ 10,925 feet regional trails</li><li>○ 40,995 feet sidewalk</li></ul></li></ul>				<ul style="list-style-type: none"><li>● Reconstruction of SF 2700N provides a regional multi-use trail</li></ul>	<ul style="list-style-type: none"><li>● The sidewalk on the south side of Spanish Fork Main Street does not continue across the SB on ramp.</li></ul>		

BEYOND DESIGN YEAR

Evaluation Criteria – Potential performance beyond the design year; reserve capacity and/or ease of future improvement.

Edit	Facts		Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses	
	<p>=====</p> <p><b>Traffic Group Input:</b></p> <p>Reserve Capacity</p> <ol style="list-style-type: none"><li>1. 2.5% projected annual growth along corridor.</li><li>2. Full buildout of UIC provides excess capacity beyond 2030.</li><li>3. 40/50 mainline segments operate at LOS C or better in the AM. (Core calculated HCS+)</li><li>4. LOS E/F northbound between University Ave and Provo Center Street and between the ramps at SR-75 in Springville.</li><li>5. 27/50 mainline segments operate at LOS C or better in the PM. (Core calculated HCS+)</li><li>6. LOS E/F northbound and southbound between University Ave and Provo Center Street.</li><li>7. Approximately 7 additional years of southbound reserve capacity from 500 East to PG Blvd; 1600 N to Provo Center; SR-77 to US-6; and SF Main to the south end of the project.</li><li>8. Approximately 7 additional years of northbound reserve capacity from the off-ramp at SF Main to the on-ramp from US-6; University Parkway to 1600 N; and PG Blvd to 500 E.</li></ol> <p>=====</p>				<ul style="list-style-type: none"><li>● This proposer's commitment to the Southern Terminus provides capacity in the transition area to 2030, 10 years beyond the 2020 requirement.</li><li>● 40/50 mainline segments operate at LOS C or better in AM.</li><li>● 27/50 mainline segments operate at LOC c or better in PM.</li><li>● Approximately 7 additional years of reserve capacity for <u>some</u> southbound and northbound segments.</li><li>● SPUI at Orem 800 North provides reserve storage capacity between adjacent intersections.</li></ul>			

MAINTENANCE

Evaluation Criteria – Assessment of long term maintenance and operating costs related to the following: Snow removal and storage; Power consumption; Need for specialized maintenance equipment; Drainage system maintenance.

Edit	Facts		Edit	Significant Strengths	Minor Strengths	Minor Weaknesses	Significant Weaknesses	
	From Data Miners:					<ul style="list-style-type: none"><li>● 11 bridges proposed with seat type abutments with higher maintenance requirements</li></ul>	<ul style="list-style-type: none"><li>● Lack of snow storage areas between PCS and UA</li></ul>	

- 338.47 lane miles of mainline pavement
- 39.86 lane miles of ramp pavement
- 44.01 lane miles of cross street pavement
- Will use trench drains
- Segments 1 and 3 do not show access roads to ponds.

Additional Information:

- LL 01 Replacing UPRR and SF 2700 N structures.
- LL 02 Provided 54" median barrier intermittently along with existing median barrier and cable barrier south of SF 300 W; provided 42" roadside barrier at all locations except for W-beam between 2700 N and University Ave.
- LNS Snow storage is not provided south of Provo Center Street.

- 43 of the 45 bridges utilize concrete girders which have low long term maintenance costs

- Significant use of W-beam and cable barrier south of UA will require additional maintenance